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SYNOPSIS OF THE AMERICAN MARTENS.

BY SAMUEL N. RHOADS.

The results summarized in the following paper are based on a rather extended examination of skins and skulls of *Mustela americana* from representative localities throughout its wide range, from the northern United States to the treeless regions of the Arctic zone. This study was primarily begun to determine the status of the southeastern marten, in connection with my recent work on the mammals of Pennsylvania and New Jersey. It has resulted in classing the southeastern animal as the most depauperate and light-colored representative of the group, and belonging more strictly to the type which Turton named from pale examples probably obtained from southeastern or central Canada. For purposes of nomenclature I have restricted typical *americana* to this region, making the east and west coast forms and the northern race, described by later authors, of subspecific value. Owing to the wide variation of *color* in this animal—skins from such widely separated habitats as the Pacific and Atlantic coasts at the same latitude being often found alike, and apparent dark or light races well known to the fur trade coming from isolated localities not correlated with faunal and floral environment in the zoogeographic sense—I have made such characters of subsidiary value to those of size and relative proportion in body, tail and foot measurements, in the character of pelage, and, above all, to cranial characters. As the latter have been largely made the basis of the examinations of Brandt, Baird, Gray, Coues and Allen, the chief monographers of the group, my own remarks will be the more pertinent from this standpoint.

The number of American specimens of skins and skulls upon which I have based these studies has been much larger than ever before brought together. They may be roughly listed as follows: Pennsylvania and Maine, 15; Quebec, 1; Ontario, 8; North Labrador, 4; New Brunswick, 30; Colorado, 6; Mackenzie prov., N.W.T. = Great Slave lake to Mackenzie bay, 26; Alaska, 7; British Columbia, Rocky mountains, 2; Cascade mountains, Washington, 30. For the use of this fine series I am indebted to the officers of the American Museum of Natural History, Field Columbian Museum, U. S. National Museum, Museum of Comparative Zoology and the Academy of Natural Sciences, Philadelphia.

Only skulls of the oldest adult males have been used in the comparative cranial diagnoses and measurements, viz., those in which the upper cranial sutures have so disappeared that the nasals are indistinguishable from the premaxillaries. I am aware that Dr. J. A. Allen has long ago (*Bull. U. S. Geol. Sur. Territ.*, 1876, Vol. 3, pp. 328–330) arrived at the same conclusions that I have reached concerning the small size of southern American martens by an independent investigation, in part, of the same specimens. But his researches were chiefly directed to a consideration of the differences between the American and Old World martens, and did not include specimens from Labrador and the Cascade mountains. I have been fortunate in securing several specimens, from the U. S. National Museum and the Academy of Natural Sciences, of Old World martens typical of *M. foina, M. martes* and *M. zibellina*, and am thus enabled to discuss their relationships with those of America. A series of thirty skulls from Kamschatka merit special mention.

As I now understand their relationships, the North American martens consist of three species and three subspecies, viz., the South Canadian marten, *Mustela americana* Turton; the Arctic marten, *M. a. actuosa* Osgood; the British Columbia marten, *M. a. abietinoides* (Gray); the Labrador marten, *M. a. brumalis* (Bangs); the Newfoundland marten, *M. atrata* Bangs; the Cascade mountain marten, *M. caurina* Merriam, and the Rocky mountain marten, *M. c. origenes* Rhoads.

Mustela americana Turton. South Canadian Marten.

1802. [*Mustela*] *americanus* Turton, Linnæus, Syst. Naturæ, Vol. I, p. 60.

1819. *Mustela vulpina* Rafinesque, American Jour. Science, 1819, p. 82. (Upper Missouri river = *M. americana* with white-tipped tail.)

1820. *Mustela leucopus* Kuhl, Beiträge Zoologie, p. 74. ("In Canada" = *M. americana* with white-tipped feet.)

1823. *Mustela huro* F. Cuvier, Diction. Sci. Naturelles, Vol. 29, p. 256. (Restricted types from the habitat of the Huron Indians, *fide* Milbert, viz., region east and south of Georgian bay, west peninsula of Ontario = *M. americana typicus*, pale form ("*blond clair*").

Type Locality.—Turton says his *M. americanus* " inhabits North

America." Undoubtedly his material was based on specimens from eastern Canada or the northeastern United States. He describes a light tawny, white-headed form, which applies more distinctively to the martens of southeastern Canada and the eastern United States as contrasted with those from farther north or from New Brunswick and Labrador. On this basis and to more intelligently map out the distribution of the subspecies already described without overturning names recently proposed, I restrict the type locality of *americana* to the region occupied by the small pale martens of southern Canada and the northern United States. The type specimens on which Turton based his species probably came from Ontario or Quebec through the Hudson Bay Company.

Faunal Distribution.—The habitat of *Mustela americana americana* is restricted to the forested areas enclosed by the following localities: Hudson bay, Northeast territory (of Labrador), Quebec, Nova Scotia, Massachusetts, northern Pennsylvania, south in the mountains to Colorado, Utah, eastern Oregon and Washington, eastern British Columbia, Alberta, Saskatchewan and southern Kewatin, south of latitude 55°.

Description of Species.—Smallest and palest of the American martens. Pelage relatively short. Colors most variable of the group, ranging from white-headed, yellow-bodied individuals to blackish-brown ones. Color of throat and breast patch varying from white to pale-orange, sometimes reaching from chin to sternum and from base of ears to insertion of forelegs, sometimes confined to a stripe or scattered spots across lower neck. These remarks in part apply to all our martens. The distinguishing color characteristics of typical *americana* may be stated to be the average paleness and yellowness of outer fur and the clear ash of basal under fur, as contrasted with all other races, and in the strongly contrasting colors of the fore parts with the hinder parts. The upper head, ears and neck are generally a pale drab-gray (*Ridgway's Nomenclature of Colors*), this often reaching half-way down the back; the lower back, thighs and rump are tinged with an unnamed shade of color combining pale-orange, rufous and yellow in an indescribable combination not found in other geographic races. This whole area is sparingly tipped with black. The bases of hairs are pale smoke-gray. The darker parts of fore and hind feet and legs and tail-brush are blackish seal brown. Certain areas within the range of *M. americana americana* above given furnish martens whose average pelts are so dark as to give them a standard market value much above skins from the surrounding country. Such a region is the upper Nipigon territory of Ontario westward toward the Lake of the Woods. The local climatic conditions of this rocky, saturated and densely wooded area are responsible for this. It is too local, however, to warrant a further subdivision. Respecting the cranial characters, upon which I have primarily based my examinations of this perplexing group, I begin by considering Gray's fundamental separation of the New World martens from *M. martes, foina* and *zibellina* on the size and shape of the last upper tubercular molar. In *americana* this is stated by him, and in measure amplified by Coues and Allen, to be different, in its hour-glass shape and greater size of the inner bulb as compared with the outer. In *americana* this tooth has but slight constriction, with resulting rectangular shape, owing to the relative equality in size of the inner and outer bulbs. A very careful examination of the large series of American martens shows that the specific separation from Old World forms on this basis is fully warranted. It is further emphasized by the character of the second lower true molar, which in all the exotic forms has a strongly characterized inner cusp, as asserted by Allen. In *americana*, Allen says, this is " not found," or " only in a very rudimentary condition." I have found it, however, in a more or less rudimentary condition in all typical *americana* skulls, except those so very old that it had been worn away. In rare instances this cusp is almost as well developed, proportionately to the smaller and narrower character of *americana* molars, as in *martes*. On this account its diagnostic value is less than that of the last upper molar. These remarks apply equally to all marten skulls I have examined taken east and north of the Cascade mountains, from Nulato, Alaska, to the coast of Maine. But when skulls from the Cascade mountain region and the Pacific coast are examined an intermediate condition is immediately noticeable. The shape of posterior upper molar corresponds more closely to that of the Old World forms, as also does the flat, rounded cranium and its broad, zygomatic width as compared with its length. In these combined respects it resembles the European beech marten, *M. foina*, more closely than it does the martens of the Rocky mountains and eastern Canada. Regarding the cranial relations of the Asiatic sable, *M. zibellina*, to our West American martens, nothing seems to have been published. Brandt, who made a critical monograph on these subjects, seems not to have had any skulls of *zibellina*. Neither did Baird, Coues, or Allen. Brandt (*Beitr. Kennt. Säugeth. Russl.*, 1855) finds no differences between the external characters of the Asiatic and West American martens, the "sables" of the "Nischnaja Tunguska occupying an intermediate position between the dark Asiatic and yellow American sables."

A fine series of sable skulls from Kamschatka, representing thirty-two specimens of the Old World *zibellina*, correspond exactly with the good figure of *zibellina* in Blainville's *Ostéographie*. Comparing these with American martens we find them larger than the largest skulls from Alaska, Mackenzie and Labrador, six old males averaging 82 mm. in basilar length and 53 mm. in zygomatic expansion. In the largest Alaskan example the basilar length is 80 mm. A specimen from Peel's river, Mackenzie territory, the largest in my American series, is 82 mm. long, while the largest Kamschatkan skull is 85 mm. long. In both size and proportions, however, these crania of *zibellina* are remarkably like *actuosa* of Alaska and *brumalis* of Labrador. But when the dental characters are examined there is a distinct separation between them, based, as above mentioned, on the great size and peculiar asymmetric saddle shape of the upper posterior grinder of *zibellina* as contrasted with the rectangular, transversely elongate shape of that tooth in *americana*. The distinction of relative size and the inner tuberculation of the lower sectorial in these Kamschatkan skulls is also a decided feature as contrasted with their nearest geographic allies in America. Comparing these *zibellina* skulls with three Swedish skulls, typical of *martes*, the close specific relationship between these two is emphasized in every character examined. On the other hand, *foina* specimens from Germany are very distinct in cranial features.

In *foina* we have a very short, broad and flattened skull, wholly lacking any sagittal ridge on the occipital crest, even in old age. The frontal constriction is relatively unpronounced. The posterior upper grinder is more rectangular in shape than in the *martes* group, and owing to the short rostrum the premolar teeth overlap at base instead of being separated by short diastemæ. In respect of the size and shape of the cranium, *foina* is far more distinct from *martes* and *zibellina* than the latter are from any American form except *caurina*. It is interesting to note in this connection that *caurina* resembles *foina* very closely in the small size and shape of its audital bullæ and the breadth and flatness of the brain-case, but in respect of the sagittal crest, frontal constriction and character of the teeth, *caurina* is closer to *zibellina*. Its homologies connect it far more closely with the Eurasian than the American type of marten, and would indicate a closer genesis from the Old World martens than from those of the New World. As it does not appear to intergrade with the latter, I am induced to consider it an isolated member of the *martes-zibellina* group. This peculiarity is not without precedent in the Asiatic character of other animals found in the habitat of *caurina*.

Measurements.—Average of six adult males from Maine, Pennsylvania and the Adirondacks: Total length, 575 mm.; tail vertebræ, 175 mm.; hind foot, 82 mm. Skulls ditto: Basilar length (from inferior lip of foramen magnum to posterior base of upper median incisors), 70.5 mm.; postorbital constriction, 16.0 mm.; zygomatic expansion, 44 mm.

Mustela americana brumalis (Bangs). Labrador Marten.

1898. *Mustela brumalis* Bangs, American Naturalist, Vol. 32, p. 502.

Type Locality.—Okak, Labrador.

Faunal Distribution. — Humid coast region of northeastern Labrador, Ungava bay to Straits of Belle Isle. Intergrading westwardly into *actuosa*, southwardly into *americana*.

Description of Species.—Mr. Bangs' description of this race was based on three skulls, presumably of males, no skins being obtained. Since then he has obtained skins, two of which, an adult male and female, have been sent to me for examination. The character of the skull of *brumalis* as compared with that of *americana* from Maine is certainly conspicuous for greater size, but the *relative proportions* when compared with specimens from Maine of same age and sex are not so marked as described by Bangs. I note that the skulls of *brumalis* are surprisingly identical in size and proportions with those of *actuosa* from the Mackenzie river district and Alaska, as shown by the fine series loaned by the U. S. National Museum. This is referred to by Osgood in his description of *actuosa*, but the skull of *brumalis* figured by him is smaller than the largest specimen I have, so that the differences Osgood seeks to draw between the two in this regard are much less than would appear. The relative size of the audital bullæ in *actuosa* and *brumalis,* where skulls of same size are compared, is so nearly the same as to make them of no diagnostic value, and the heaviness of dentition falls under the same restrictions. Taking these two races of *americana* and contrasting them therewith, the Pennsylvania and Maine specimens show an extreme diminution of size, being about 10 mm. shorter and relatively somewhat narrower than the northern races; but we are unable to make these differences in size, great as they appear, of specific value, for the martens from the north shore of Lake Superior and from Tobique and Trousers lake, New Brunswick, are plainly intermediate and connectant in cranial characters, measuring only 5 to 6 mm. shorter than the largest skulls of *actuosa* and *brumalis.* No doubt skulls from western Labrador and Keewatin would complete the chain of gradation thus indicated. It may be remarked that the development of sagittal crest in *actuosa* and *brumalis,* and the posterior angularity and expansion of their zygomæ, are more or less in excess of any specimens of the southern animal; but an examination of the cuspidation, size and outline of the teeth in all the forms except *caurina* shows that so-called differences are confined to individual variation, as proved by the unusually large series of crania now in hand. In color, *brumalis* is separable from any other eastern interior form on account of its dark shades. In the male specimen from Okak there is a close resemblance to the specimen from Sullivan county, Penna., both in tint and pattern of coloration, the difference consisting almost solely in the greater length of the coarser long hairs of the over fur. These are also blacker and the median (subapical) shade of upper back, sides and rump is less fulvous. The color of the under fur is a shade darker ash than that of the Pennsylvania specimens. In the female Okak specimen the whole body colors are much darker than in the male, being a blackish chocolate, and the fulvous cast of under fur seen in the male is replaced by a cinnamon or bistre shade in the female. In both, the head is lighter than the body. As compared with *actuosa* the Labrador form is much darker, Mackenzie river *actuosa* being characterized from all others by the contrast of their light-hued sides and heads with the darkly contrasted brown-black of the median dorsal area. An average of the *actuosa* series would class as "pale" in the furrier's nomenclature, while *brumalis* would class as "dark." On the other hand, *actuosa* is of a very different sort of "pale" from typical *americana,* such as we find in New Brunswick and Maine. These latter are termed "canaries" by the furriers and are distinguished from the *actuosa* type by the pale-orange, buffy or ochraceous suffusion of back and sides, some of them assuming a peculiar golden hue. All these pale color conditions of the southern animal, more on account of tint than paleness, detract materially from their commercial value as compared with those pale skins which are typical of the interior Arctic martens.

Measurements of brumalis.—Total length of ♂, 680 mm.; tail vertebræ, 195 mm.; hind foot, 115 mm.: of ♀, 585, 179, 91 mm.: both specimens from Lance Au Loup. Skull measurements of four adult males average: Basilar length, 79 mm.; interorbital constriction, 16 mm.; zygomatic expansion, 52 mm.

Mustela americana actuosa Osgood. Arctic or Alaska Marten.

1900. *Mustela americana actuosa* Osgood, North American Fauna, No. 19, p. 43.

Type Locality.—Fort Yukon, Alaska.

Faunal Distribution.—British America, north of latitude 55° to Barren Grounds; east to western Labrador peninsula (Northeast Territory); west to Coast Ranges of British Columbia and Alaska; south in Rocky mountains almost to northern boundary of the United States.

Description of Species.—Osgood, the describer of this race, has correctly characterized it in his original description and figure as compared with *americana typicus,* but, as previously stated, he has emphasized too strongly the distinctions between it and *brumalis,* as now evidenced by the additional skulls of *brumalis* secured by Mr. Bangs.

Osgood's description of color characters of type may be quoted in part as follows: "Posterior half of upper parts pale ochraceous-buff, shoulders and anterior part of upper parts gradually becoming grayish; entire upper parts except head overlaid with coarse brown hairs; head, including cheeks and throat, pale grayish-white, lightly mixed with brown, especially on nose and chin; inside and edges of ears whitish; outside and bases of ears brown. Under parts similar to upper parts, but darker and more brownish on chest.'' This description is taken from a lighter individual with more ochraceous cast than the average. Several of the Peel's river specimens have scarcely any ochraceous cast, but rather a drab-brown tinge ; but even in these the grayness and clearness of the brown from the '' canary '' shade of typical southern *americana* is very noticeable. For a fuller discussion of these differences see under *M. americana brumalis* above, where the cranial characters of both forms are also discussed at length. Also, see remarks under *M. americana typicus.*

Measurements. — Average of eight selected old adults, males, measured in flesh: Total length, 671 mm. ; tail vertebræ, 204 mm. ; hind-foot, 109 mm.; ear height, 40 mm. Skull measurements (average of six adult males) : Basilar length, 80 mm. ; interorbital constriction, 16 mm.; zygomatic expansion, 51 mm. In the type of *actuosa* the occipito-nasal length is given by Osgood as 85 mm., and the zygomatic expansion 55 mm. This is larger than any of the rest of the large series belonging to the U. S. National Museum.

Mustela americana abietinoides (Gray). British Columbia Marten.

1865. [*Martes americana*] var. 1, *abietinoides* Gray, Proc. Zool. Soc., London, p. 106.

Type Locality.—'' Rocky Mountains (Drummond and Lord),'' Gray. As Gray's *abietinoides* thus included two distinct species, one of which was undoubtedly *caurina* (collected by Lord), I have now restricted it to the Rocky mountain specimens taken by Drummond. Drummond's itinerary, as given by Richardson (*Fauna Boreali Americana,* Vol. I, p. xvi), shows that he did not collect specimens west of the Selkirk Range, hence not within the range of *caurina.* The description of *abietinoides* by Gray evidently refers to dark specimens characteristic of the humid environment of the Selkirks, into which Drummond says he penetrated just before his recall home. The marten of the main arid chain of the Rockies is evidently a lighter colored animal. On these considerations I have seen fit to define the restricted type locality of *abietinoides* to the edge of the humid western slope of the Rocky mountains, somewhere between Kicking Horse pass and the Columbia river. It is significant that this is also the eastern limit of the ''*Abies*'' *mertensiana* or Western hemlock, after which Gray named his so-called '' variety '' *abietenoides,* probably on account of notes made by Drummond or Lord as to the habitat of the type specimens of this marten.

Faunal Distribution.—Humid interior region of British Columbia, peculiar to the Selkirk and Gold Ranges.

Description of Species.—Gray's description reads: "Black-brown; ears pale, head grizzled with white hairs, more or less gray; throat yellow or yellow-spotted; throat spot large or broken up into small spots; the head sometimes with only a few gray hairs, and the throat with only a few distinct small spots." A specimen sent to me from Vernon, British Columbia, by W. C. Pound, a taxidermist with whom I became acquainted while in that place in 1892, is of especial interest in this connection. It was taken November 22, 1892, and no doubt was brought to Mr. Pound by an Indian trapper whom he dealt with, living in the Gold Range above Vernon. Such, at least, was the source of his supplies of larger game and furs during my residence there. The skull and skin of this specimen indicate it to be an adult, but not very aged, female. The naso-premaxillary sutures are not wholly obliterated, as in over-aged specimens, but the occipital crest is that of a fully matured marten, perhaps three or four years old. The color of this specimen answers exactly Gray's description of "*black-brown.*" In this respect it is instantly distinguished from all other of the specimens of marten I have before me, both by the quality and depth as well as the uniformity of its coloration. In terms of ***Ridgway's Nomenclature of Colors,*** this specimen is seal-brown throughout, both above and below, with exception of the sides of the head, the interior of ears and a small irregular throat patch. The shade of this seal-brown is blackest on tail, feet, legs and middle back. On sides, under parts, neck and head it is more of a vandyke-brown, but nowhere buffy, ochraceous or orange, as in all other martens I have examined.[1] A cheek patch between ear and eye and the insides and margins of ears are grayish-drab, but the rest of head above and below is not noticeably paler than neck as in all others of the *americana* group found east of the Rocky mountains. Scattered white hairs are noticeable among the dark body pelage above and below, being more numerous about head, neck and breast. The narrow, irregular throat patch reaches from angle of lower jaw to near base of neck, being about two inches long and three-quarters of an inch broad in the widest part Its color is ochraceous-buff. The fullness, density and length of pelage is noticeable, and the slight contrast in color of the basal portion of the fur with that of the apical half is unique, so far as I have examined specimens. In even the darkest Labrador skins of *brumalis*, the triple-zoned color pattern typical of marten fur is quite as marked as in lighter-hued races; but in *abietinoides*, as illustrated by this Gold Range specimen, the subapical or intermediate color zone of the individual hairs is absent and their dark apices merge insensibly into the more ashy-brown of their bases. Taken as a sample, this skin would seem to me to indicate that the Selkirk mountain animal furnishes one of the most desirable marten pelts, from the furrier's standpoint, that can be found in North America.

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[1] The Newfoundland species, *M. atrata,* which I have not seen, is probably another exception.

The skull of this specimen, as well as that of another, sexed female, from the same locality, show, in comparison with female skulls of same age from the Mackenzie river regions, that *abietinoides* is not only specifically identical with *M. a. actuosa*, but that it is only slightly smaller in size, being intermediate in the latter feature between *M. americana* of Lake Superior and Arctic examples of *actuosa*. As regards coloration, *abietinoides* is farther removed from *actuosa* than any other race of the *americana* group. It is allied most closely, as regards color pattern, with its geographic ally, *origenes* of the main Rocky mountain chain. The teeth, audital bullæ and the proportions and configuration of skull in *abietinoides* are precisely as in the *americana*, as contrasted with the *caurina* type of cranium.

Prof. Oldfield Thomas, who examined for me the Drummond and Lord specimens of *Mustela* in the British Museum which formed the basis of Gray's *abietinoides*, agrees with me that the Drummond specimens should be considered the types in a determination as to the status of this name. As the use by Gray of one or more specimens, probably taken by Lord in the habitat of *caurina*, further necessitates this division, the natural course, as already somewhat explained under remarks on "*type locality*," has been to retain *caurina* for these and restrict *abietinoides* to the very distinct race of *americana* inhabiting the hemlock and cedar (*Tsuga et Thuja*) forests of the western offshoots of the British Columbia Rockies. Prof. Thomas states that a Drummond specimen in the British

Museum is less dark than some of the Lord specimens. Unless the exact locality were given, it is not improbable that some of Drummond's specimens (if there were many) may have come from localities in the eastern Rockies, where that naturalist did most of his collecting. In such a case the question would seem to be complicated by specimens of *origenes*, which is almost undoubtedly the race found on the headwaters of the Red Deer river in the Purcell Range, where Drummond wintered. But the gist of the matter, shorn of these complications, is Gray's desire to designate by name a dark American marten found in the Rocky mountains by Drummond. As no special type from a series of British Columbia specimens was designated by Gray, and as a special type or race agreeing with his description has been found to live in the habitat designated, it is within our province here to give it fixity by restriction and elimination, rather than ignore or reject it as a nomenclatural enigma. It may be added that an examination of J. K. Lord's itinerary shows that it is very unlikely he secured any specimens from the habitat of *abietinoides* as I have restricted it. His operations with the Boundary Commission in the Rocky mountains lay entirely south of the Selkirk and Gold Ranges.

Measurements.—Made by collector from specimen No. 633, Coll. of S. N. Rhoads, ♀, Gold Range, near Vernon, B. C., by W. C. Pound; taken November 22, 1892: Total length, 584 mm.; tail vertebræ, 178 mm.; hind foot (dry measurement), 87 mm. Skull (of same specimen): Basilar length, 70 mm.; zygomatic expansion, 43 mm.; postorbital constriction of frontals, 17 mm. Measurements of the male, judging by analogy of the sexual differences in other races, would nearly equal those given for *actuosa* and *brumalis*.

Mustela atrata Bangs. Newfoundland Marten.

1897. *Mustela atrata* Bangs, American Naturalist, Vol. 31, p. 162.

Type Locality.—Bay St. George, Newfoundland.

Faunal Distribution.—Newfoundland.

Description of Species.—I have seen no specimens of this form, which seems nearly related in size and color, etc., to the dark martens of the northern Rocky mountains. As it is confined to the island, it is considered by Mr. Bangs, its describer, as a distinct species, on geographic rather than anatomical grounds. Its affinities with *americana,* however, judging by the original description, are cranially much closer than to those of *brumalis, actuosa,* etc.

In such a case it would seem preferable to make exception to the arbitrary ruling of specific recognition (as contrasted with racial separation), based primarily on geographic isolation. The subspecific differences of *atrata,* from the standpoint of coloration alone, appear to merit its separability from typical *americana.*

The color of *atrata* is said by Bangs to be "Deep chocolate, becoming black on back, head, arms, legs, rump and tail; a few white hairs scattered along back; chest and under side of neck irregularly blotched with orange; a median line of orange on belly; ears black, narrowly bordered all round with dull white." This indicates a much blacker and more orange-spotted animal than any other marten known to me except a specimen from near Vernon, British Columbia, in the interior region west of the Selkirk Range. In this last specimen, however, the orange spot is small, and does not extend below the base of neck. Bangs says further: "Skull about the size of or larger than that of *M. americana;* rostrum narrow, audital bullæ much larger and deeper than in *M. americana* . . . . ; dentition rather weaker throughout, with greater spaces between premolar teeth than that of *M. americana.* Unfortunately, the skulls as well as the type skins were from females. But as other skulls, probably from males, were examined by him, it is likely his diagnosis includes them, showing the close affinity of *atrata* to typical *americana* from New Brunswick.

Measurements.—Fide Bangs from two females, types: Average total length, 550 mm.; tail vertebræ, 185 mm.; hind foot, 88 mm.; ear from notch, 42 mm. Skull of type: Basilar length, 69.2; zygomatic expansion, 42 mm.

Mustela caurina Merriam. Pacific Marten.

1890. ***Mustela caurina*** Merriam, North American Fauna, No. 4, p. 27.
1865. ***Martes americana,*** var. 1, ***abietinoides*** Gray (in part; referring to J. K. Lord's specimens), Proc. Zool. Soc. Lond., p. 106.

Type Locality.—Near Gray's Harbor, Chehalis county, Washington.

Faunal Distribution. — Humid coast and Cascade mountain region of western United States, British Columbia and probably southern Alaska, from northern California northward, east to summit of Cascade Range. Geographic connection with *M. c. origenes* problematic.

Description of Species.—The Cascade mountain marten, as illustrated by a very large series of skulls in my collection from Lake Kichelos, Kittitas county, Washington, taken at elevations of 8,000 to 10,000 feet, shows cranial characters so different from any of the other American martens as to suggest a distinct species. It is significant, also, to note that their departure from the *Mustela americana* type is in the direction of the Old World species, as originally observed by Brandt and Merriam and confirmed by the exceptional series in my hands.

As compared with skulls of *M. a. actuosa* from Mackenzie, B. A., and *M. americana* from north of Lake Superior (with the latter of which they correspond almost exactly in length), the following differences are prominently noticeable: The skull of *caurina* viewed from above is greatly broadened and flattened; the zygomatic breadth in an old male from Lake Kichelos is to the basilar length as 52 to 74; in a male skull of similar age and sagittal development from Lake Superior these proportions are as 47 to 74, the skulls in each case being the same length. In the largest skull from the Mackenzie river the zygomatic breadth only exceeds that of the largest Washington specimen by 1 millimeter, but its basilar length exceeds the latter by 6 mm. In conformity to this relative shortening and widening, *caurina* has a markedly wide brain-case and interorbital region, the postorbital processes being widely and bluntly developed and the frontals abruptly constricted behind them, so that while this constriction is as narrow as in *actuosa*, the greatest supraorbital width is 1 mm. greater than in the largest *actuosa* skull. The lowness or flatness of the cranium is also marked. In the skulls already alluded to, *caurina* has a maximum height from the audital bullæ to crest of occiput of 29 mm., while *actuosa* is 32 mm. high. Viewed from below, the audital bullæ of *caurina* are instantly seen to be very small as compared with *americana* of same sized skull. They are also of a different shape, being flat, shortened and squared anteriorly, forming a sort of retangular outline, whereas *americana* and *actuosa* are more triangular, tumid and elongate. The last upper molar presents differences from all *americana* forms quite as radical and strangely similar to those claimed by authors as warranting the specific separation of the *americana* group from the Old World martens. In all the adult representatives of *caurina* I have examined, this tooth is analogous in character to that of specimens labeled *martes* and *foina* in the collection of the Academy of Natural Sciences, and also to Blainville's superb figure of *zibellina* in Plate 7 of the *Ostéographie.* The character alluded to is the relatively large size of this molar and the wide expansion of its inner bulb or saddle as contrasted with the exterior section of the same, giving the tooth a rounded, emarginate, triangular shape as contrasted with the narrow, rectangular lateral elongation characteristic of the *americana* series. In the latter the ratio of greatest breadth to length of tooth is as 5 to 8, in *caurina* it is as 7 to 9. In a specimen labeled *martes* from Europe this ratio is 7½ to 9, the numbers in all three cases being actual millimeter dimensions of the teeth. Another character in this tooth common to *caurina*, *zibellina* and *martes* is the tendency to a double median tuberculation of the inner bulb, instead of the single elongate tubercle always found in *americana typicus* and its races. This is clearly resultant from the greater width of the inner bulb in *caurina* and its Old World allies, thus allowing room for subdivision of the tubercle. A further analogy between *caurina* and the Eurasian, as contrasted with the American type of dentition, is seen in the large lower sectorial. In the former this tooth is much wider and heavier than in the *americana* group and the inner median tubercle is strongly developed. In *americana* it is generally rudimentary, but not always so.

Some of these characters are pointed out by Dr. Merriam in his original description of *caurina,* but his statement that the inner cusp of the lower sectorial is wanting in male *caurina* is disproved by my large series. The skulls of Merriam's types were not fully adult, however.

In color, *caurina* is a richer brown than any of the *americana* group, more inclining to cinnamon in upper body color. This shade is more uniform throughout the entire length of upper parts to head, which is not so distinctly lighter in color as in all other average East American martens. The head is an almost uniform shade of pale Mars-brown, not lightening on cheeks and ears as in eastern *americana* types. A marked difference peculiar to *caurina* is found in the extensive area and rich tint of the dark orange-buff throat and breast patches. This area begins at the angles of the jaw, reaches up along sides of neck to and including inner base of forelegs, and stretches by spotted interruptions almost to vent, the main body of color terminating on lower breast. The rich coloring and great size of this pattern seem constant in a series of Cascade mountain skins before me. A tendency to scattered long silvery hairs through the upper pelage is noticeable as contrasted with *americana.* This feature is also in the direction of *zibellina.*

In external character the relative length of the tail of *caurina* is greater than in any other form of American marten except *origenes.* This in a comparison made with my series of Lake Kichelos skins, which were measured in the flesh by collector, Mr. Allan Rupert. It appears likely, however, that his measurements included part of the brush of tail, as the measurement of the dry specimens now seems to indicate. Allowing for this, however, the *caurina* specimens indicate a long-tailed marten, as the average below given of six old males indicates. See further discussion of cranial characters under *M. americana typicus.*

Measurements.—Total length, 675 mm.; tail, 270 mm.; hind-foot, 90 mm. Deducting from this 50 mm., the length of the body of tail pencil, leaves the total length 625 mm., and the tail vertebræ 220 mm., which is much greater relatively and absolutely than in other American martens whose size exceeds *caurina.* The length of the body, skull and hind foot are nearly identical with the medium-sized martens of southern Canada. It is to be regretted that Dr. Merriam gave no body measurements of his types of *caurina.* Skull measurements (average of six old males): Basilar length, 74 mm.; zygomatic expansion, 51; interorbital constriction, 15. For relative dimensions of teeth, see above under description of species.

Mustela caurina origenes[2] subsp. nov. Rocky Mountain Marten.

Type, No. 112,170, young adult ♀, collection of U. S. National Museum, from "Marvine Mountain" (Garfield county ?), Colo. Collected by Ernest T. Seton (E. Seton-Thompson), September 16, 1901.

Faunal Distribution.—Southern Rocky mountain region; higher ranges of New Mexico (?) northward; probably replaced in the

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[2] From the Greek, meaning "*a mountain race.*"

Canada Rockies by a race of *americana.* Geographic connection with *caurina* problematical.

Description of Subspecies.—Strikingly different from all other American martens except *caurina* in the absence of the light-colored cheek patches. Head relatively darker, as compared with upper body colors, than in *caurina;* ears lacking a white border or inner lining of white hairs. Gular and pectoral patch extensive, wide, connected by interrupted streaks along median abdominal line with well-defined narrow pre-ventral area of similar color. Color of gular patch a peculiar buffy-orange, as in *caurina,* lightening somewhat at armpits. Entire upper parts, including head, ears, legs and sides, and lightening somewhat on belly, "wood-brown," the longer, darker hairs of middle back and rump being "broccoli-brown," and the brush of tail and soles of feet "clove-brown." Ears edged with ochraceous-buff. Tail relatively long, as in *caurina.* The concolor appearance of *origenes* viewed from above is even more striking than in *caurina,* the whole of head, excepting the ear-margins, being quite as dark as the neck and shoulders and these not noticeably darker than the back. The under parts show precisely the same color and pattern characters which distinguish *caurina* from *americana.* Indeed, it was these, together with the characters of the skull, which upset my previous ideas (based on geographic reasons) that *origenes* was a race of *americana.* Fortunately there are five skins and three skulls of Colorado martens at hand, and these all show with remarkable uniformity the constancy of the characters of type as above given. It is to be regretted that no skin with skull of an adult male is available. An adult male skin, topotype, also collected by Mr. Seton the last of August, and a female collected on the Great Divide in Boulder county, fit the above description exactly. The skull of two females, one from Boulder county, the other the type, are not enough matured to give the maximum measurements, but the skull of an old adult female from North Park furnishes these, showing *origenes* to be of the same size and proportions as *caurina* of the same sex. Coming to an examination of the teeth our surmises, based on external characters, are so completely verified that any zoogeographic preconceptions we may have had as to affinity of *origenes* with *americana* are swept away. The peculiar saddle-shaped upper posterior grinder of *origenes,* with its widely flaring inner flange, and the relatively small, flattened and rectangular audital bullæ declare its affinities to be with *caurina* and not with *americana*. It is a pale race of *caurina,* seemingly out of place in its zoogeographic status, and presenting a puzzling thought as to the relationships of the animal living on the main chain of the Rockies in British Columbia, which our present knowledge of *abietinoides* certainly indicates should be an ally of *americana.* Should the marten of the northern arid Rockies prove to be an *americana* form, as we would naturally predict, at what point then shall we look for the geographic gap which separates it from *origenes* and where the bridge which connects *origenes* with its kinsman *caurina* of the Pacific slope ? These are problems for the "next reviewer."

Measurements of Type.—♀ (recorded by collector): Total length, 612 mm.; tail vertebræ, 210 mm.; hind foot, 76 mm. Measurements of an adult male skin, topotype, collected by Seton (from dry specimen): Total length, 676 mm.; tail, 230 mm.; hind foot, 85 mm. Skull (of ♀ type): Basilar length, 65 mm.; zygomatic expansion, 40 mm. Measurements of an old adult ♀ skull from North Park, No. 13,985, Coll. Amer. Mus. Nat. Hist., N. Y.: Basilar length, 65 mm.; zygomatic expansion, 43 mm.; post-orbital constriction of frontals, 14 mm.